REMARKS

Claims 8, 10-13, 15-18, and 24-36 are pending in the application. By this response, Claims 8, 25, 33, and 35 have been amended and Claim 14 has been canceled. No new matter has been added.

Initially, Applicants gratefully acknowledge the indication in the Official Action that Claim 29 has been allowed and that Claim 25 contains allowable subject matter. For reasons stated below, however, it is respectfully submitted that the remaining pending claims are also patentable.

Reconsideration and allowance are respectfully requested in view of the following remarks. However, initially it should be noted that the prior art rejections cannot be maintained without the non-analogous Clarke reference.

The Reasons for Reversal in the Board Decision in Application No. 09/749,923

As a preliminary matter, the rejections should be withdrawn because Clarke fails to cure the deficiencies of the primary reference in the same way that the secondary reference (Fagan) failed to cure the deficiencies of the primary reference in commonly assigned Application No. 09/749,923 (now issued as U.S. Patent No. 6,790,242). In reversing the rejection in Application No. 09/749,923, the Board stated that Fagan, which was cited by the Examiner for disclosure that mixtures of fullerene compounds are useful as corrosion resistant coatings, did not disclose: (1) the types of surfaces that could be rendered corrosion resistant, (2) that the fullerene containing material could be applied to surfaces of components commonly used in semiconductor processing equipment, and (3) that fullerene containing materials are resistant to plasma from a semiconductor reactor.

In the Board Decision, the Board explained, in part,

> Fagan does not disclose the types of surfaces that could be rendered corrosion resistant. Fagan does not disclose that the fullerene containing material could be applied to surfaces of components commonly used in semiconductor processing equipment. Further, Fagan does not disclose that fullerene containing materials are resistant to plasma from a semiconductor reactor. ... The Examiner has failed to cite evidence in the prior art that the suggestion to modify the cited references as proposed by the Examiner exists. (Pages 4-5 of Decision on appeal under 35 U.S.C. § 134 in Application No. 09/749,923).

Applicants respectfully submit that Clarke, like Fagan, fails to provide any suggestion to modify the primary reference in the manner proposed by the Examiner.

1) Clarke Does Not Disclose Rendering Components of Semiconductor Processing Equipment Corrosion Resistant

As noted above, the Board in Application No. 09/749,923 found that Fagan did not disclose the types of surfaces that could be rendered corrosion resistant. The types of surfaces to be rendered corrosion resistant by non-analogous Clarke are completely unrelated to semiconductors. The only examples given for the types of surfaces to be rendered corrosion resistant by non-analogous Clarke are those of a ship or a military or commercial aircraft. (Column 1, Lines 11-12 and Column 3, Lines 3-4). Clarke is silent regarding semiconductor processing equipment. Thus, Clarke does not provide any suggestion to render components of semiconductor processing equipment corrosion resistant.

2) Clarke Does Not Disclose Applying Liquid Crystalline Polymer to Components of Semiconductor Processing Equipment

As noted above, the Board in Application No. 09/749,923 found that Fagan did not disclose that the fullerene containing material could be applied to surfaces of components commonly used in semiconductor processing equipment. As noted above, the types of surfaces to be rendered corrosion resistant by non-analogous Clarke are completely unrelated to semiconductors. The only examples given for the types of surfaces to be rendered corrosion resistant by non-analogous Clarke are those of a ship or a military or commercial aircraft. (Column 1, Lines 11-12 and Column 3, Lines 3-4). Clarke is silent regarding semiconductor processing equipment. Accordingly, Clarke does not provide any suggestion to apply liquid crystalline polymer to components of semiconductor processing equipment.

3) Clarke Does Not Disclose Liquid Crystalline Polymer As Plasma Resistant

As noted above, the Board in Application No. 09/749,923 found that Fagan did not disclose that fullerene containing materials are resistant to plasma from a semiconductor reactor. Again, the types of surfaces to be rendered corrosion resistant by non-analogous Clarke are completely unrelated to semiconductors. The only examples given for the types of surfaces to be rendered corrosion resistant by non-analogous Clarke are those of a ship or a military or commercial aircraft. (Column 1, Lines 11-12 and Column 3, Lines 3-4). Clarke is silent regarding semiconductor processing equipment. Therefore, Clarke does not provide any suggestion that liquid crystalline polymer would be plasma resistant.

Given that Clarke is defective for the same three reasons Fagan was defective in the reversal of the prior art rejection in Application No. 09/749,923, it is respectfully submitted that the combination of non-analogous Clarke with the primary reference fails to suggest the claimed invention.

4) Examiner's Analysis of the Board Decision in Application No. 09/749,923

Applicants disagree with the Examiner's analysis of the Board decision in Application No. 09/749,923. On page 9 of the Official Action, the Examiner asserts that

> The Board of Patents Appeals and Interference[s] reverse[d] the rejection because the examiner in 09/749,923 concluded that 'it would have been within the scope of one of ordinary skill in the art to combine the teachings of applicants admitted prior art and Fagan to achieve further corrosion resistance" (page 4, 4th paragraph). The examiner in the current application does not use the admitted prior art as a reason for combining the reference. The examiner clearly shows that the motivation for combining the references is disclosed in the prior arts cited by the examiner.

As noted above, Applicants respectfully submit that the Board reversed the rejection in Application No. 09/749,923 because the Fagan did not disclose: (1) the types of surfaces that could be rendered corrosion resistant, (2) that the fullerene containing material could be applied to surfaces of components commonly used in semiconductor processing equipment, and (3) that fullerene containing materials are resistant to plasma from a semiconductor reactor, rather than because the Examiner relieved on admitted prior art. Clarke is defective for the same three reasons that Fagan was defective in the reversal of the prior art rejection in Application No. 09/749,923.

Thus, for the reasons noted above, it is respectfully submitted that the Examiner should withdraw the rejection over Shamouilian '485 in view of non-analogous Clarke.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. Without conceding the propriety of the objection, Claims 8, 25, 33, and 35 have been amended, obviating the objection to the specification. Accordingly, withdrawal of the objection to the specification is respectfully requested.

Rejection Under 35 U.S.C. §112, Second Paragraph

Claims 8, 10-12, 14-15, 17-18, 25-28, and 33-34 stand rejected under 35 U.S.C. §112, second paragraph, for the reasons stated at pages 2-3 of the Official Action. Without conceding the propriety of the rejection, Claims 8, 25, 33, and 35 have been amended, obviating the rejection. Accordingly, withdrawal of the rejection is respectfully requested.

Rejection Under 35 U.S.C. §103(a)

Claims 8, 10, 13-18, 24, 26, 30, and 33-36 stand rejected over U.S. Patent No. 5,606,485 ("Shamouilian '485") in view of non-analogous U.S. Patent No. 6,120,854 ("Clarke"). Claims 11 and 27-28 stand rejected over Shamouilian '485 in view of non-analogous Clarke as applied to Claim 8, and further in view of U.S. Patent Publication No. 2002/0036881 ("Shamouilian '881"). Claims 31-32 stand

rejected over Shamouilian '485 in view of non-analogous Clarke as applied to Claim 13, and further in view of U.S. Patent Publication No. Shamouilian '881. Claim 12 stands rejected over Shamouilian '485 in view of non-analogous Clarke as applied to Claim 10, and further in view of U.S. Patent No. 4,736,087 ("Whitlock"). The reasons for the rejections are set forth on pages 4-9 of the Official Action. The rejections are traversed for the following reasons.

Claim 8 recites "a component of semiconductor processing equipment, the component comprising a substrate having a surface and a liquid crystalline polymer coating on the surface of the substrate and forming an outer surface of the component, the outer surface being resistant to plasma erosion and corrosion in the semiconductor processing equipment, wherein the component is a component selected from the group consisting of a plasma chamber wall, a gas distribution plate, a gas ring, a pedestal, an electrostatic chuck and a focus ring." (Emphasis added). As recited in Claim 8, the component comprises a liquid crystalline polymer coating forming an outer surface of the component and which is resistant to plasma erosion and corrosion in semiconductor processing equipment. It is respectfully submitted that the applied references fail to suggest the claimed component for the following reasons.

Shamouilian '485 discloses an electrostatic chuck 20 including a substrate 28 and an insulator 22, in which an electrode 24 is embedded, on the substrate 28. The insulator 22 forms the outer surface of the electrostatic chuck 20. The insulator 22 can be a ceramic material or a polymer, and typically comprises a polymer. See the paragraph bridging columns 4 to 5 of Shamouilian '485. It is acknowledged in the Official Action that Shamouilian '485 does not disclose or suggest a "liquid crystalline

polymer coating on the surface of the substrate and forming an outer surface of the component," as recited in Claim 8.

However, Shamouilian '485 not only fails to disclose or suggest the claimed liquid crystalline polymer coating, which is effective to protect the component from plasma erosion and corrosion in semiconductor processing equipment, but includes disclosure that would have led one having ordinary skill in the art away from the claimed liquid crystalline polymer coating. Particularly, Shamouilian '485 discloses that a protective coating can be applied on the upper surface of the insulator 22 for the purpose of protecting the insulator 22 from corrosive and erosive processing environments. See column 5, lines 51-55. Shamouilian '485 references U.S. Application No. 08/052,018 as describing "preferred protective coatings and processes for their fabrication." Applicants note that the '018 application was abandoned, but a continuation of the '018 application issued as U.S. Patent No. 5,560,780 to Wu et al. Wu discloses forming a protective coating on polymeric dielectric materials provided on a wafer support in a semiconductor wafer processing apparatus to electrostatically clamp a wafer to the support. According to Wu, for an aluminum wafer support, the protective coating is of an inorganic aluminum compound. See column 4, lines 16-20, of Wu. Thus, also according to Shamouilian '485, an inorganic aluminum compound should be used as the protective coating to protect the insulator 22 from corrosive and erosive processing environments. Shamouilian '485 thus does not suggest that a liquid crystalline polymer coating can be applied as the protective coating on the insulator 22, or that the insulator 22 can be of a liquid crystalline polymer.

According to MPEP 2141.02, page 2100-127, "[a] prior art reference must be considered in its entirety, i.e., as a whole, including portions that would have led away from the claimed invention." (Citation omitted). Applicants submit that Shamouilian '485, when properly considered in its entirety, would have led one having ordinary skill in the art away from modifying the electrostatic chuck 20 in a manner necessary to result in the component recited in Claim 8.

Despite the deficiencies of Shamoulian '485 with respect to the claimed component, the Official Action asserts that Clarke discloses use of a liquid crystalline polymer coating and that it would have been obvious to modify the Shamouilian '485 electrostatic chuck 20 by using liquid crystalline polymer "because it is capable of withstanding high temperature due to significant melt strength property." Applicants respectfully disagree with these assertions.

The only examples given for the types of surfaces to be rendered corrosion resistant by non-analogous Clarke are those of a ship or a military or commercial aircraft. (Column 1, Lines 11-12 and Column 3, Lines 3-4). For the reasons stated in the response filed on January 24, 2005, Applicants submit that Clarke is non-analogous prior art with respect to the claimed subject matter. Particularly, Clarke is not a) directed to the field of semiconductor processing equipment or b) reasonably pertinent to the problem to which the claimed component is directed to; i.e., to providing a plasma erosion resistant and corrosion resistant surface on components of plasma processing equipment. The claimed outer surface of a liquid crystalline polymer can reduce particle and metallic contamination of semiconductor wafers processed in the equipment. Accordingly, because Clarke is non-analogous prior art with respect to the claimed subject matter, the rejection should be withdrawn.

Moreover, the Official Action has failed to establish the required motivation to modify the Shamouilian '485 electrostatic chuck 20 in a manner necessary to result in the component recited in Claim 8. As discussed above, Shamouilian '485 discloses that an inorganic aluminum compound can be applied over the insulator 22 to protect the insulator from corrosive and erosive processing environments. As such, the applied combination of Shamouilian '485 and Clarke does not suggest modifying the electrostatic chuck 20 by applying a protective outer coating of a liquid crystalline polymer.

Clarke does not disclose or suggest that the liquid crystal polymer would be suitable for use as a protective coating in a plasma environment of semiconductor processing equipment, much less that the coating can reduce particle and metallic contamination of semiconductor wafers processed in the equipment. Also, according to Wu, the protective coating needs to have specific electrical properties to allow its use in an electrostatic chuck. See column 4, lines 7-15. Clarke does not disclose any electrical properties of the liquid crystal polymer material, much less disclose that it would have the needed electrical properties disclosed by Wu.

Clarke also does not suggest forming the Shamouilian '485 insulator 22 of the liquid crystalline polymer. Clarke discloses that the liquid crystalline polymer is applied as a protective coating on ships and aircraft and clearly does not suggest that it could be used to make an insulator region of an electrostatic chuck for semiconductor processing.

However, it is well-established that the prior art itself, and not Applicants' disclosure, must provide a reasonable expectation of success. *See, e.g.*, In re Vaeck, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991). The Official Action has not

established that one skilled in the art would have a reasonable expectation of success of using Clarke's coating in a plasma environment. Accordingly, the Official Action provides an inadequate basis for establishing the requisite motivation for combining Shamouilian '485 and Clarke.

For at least the foregoing reasons, Applicants respectfully submit that the component recited in Claim 8 is patentable. Dependent Claims 10, 14, 15, 17, 18, 26 and 33 are also patentable for at least the same reasons as those discussed with respect to Claim 8. Moreover, these dependent claims recite additional combinations of features that further patentably distinguish the claimed component over the applied references. For example, Claim 33, as amended, recites that "the component is selected from the group consisting of a plasma chamber wall, a gas distribution plate, a gas ring, a pedestal and a focus ring." In contrast, Shamouilian '485 only discloses an electrostatic chuck.

Independent Claim 13 recites "a component of semiconductor processing equipment, the component comprising a substrate including a surface and a plasma-sprayed liquid crystalline polymer coating on the surface of the substrate and forming an outer surface of the component, the outer surface being resistant to plasma erosion and corrosion in the semiconductor processing equipment." (Emphasis added). Applicants respectfully submit that the component recited in Claim 13 is also patentable over the applied references for reasons discussed above.

Dependent Claims 16, 24 and 30 are also patentable for at least the same reasons as those for which Claim 13 is patentable.

Applicants respectfully submit that Shamouilian '881 also fails to disclose or suggest modifying the Shamouilian '485 electrostatic chuck 20 to include the

combination of features recited in Claims 8 and 13, including a protective liquid crystalline polymer coating. Thus, the subject matter recited in Claims 11, 27, 28, 31 and 32 would not have been rendered obvious by the applied combination of references.

Applicants respectfully submit that Whitlock also fails to disclose or suggest modifying the Shamouilian '485 electrostatic chuck 20 to include the combination of features recited in Claim 12, including a liquid crystalline polymer coating. Thus, the subject matter of Claim 12 would not have been rendered obvious by the applied combination of references.

Therefore, withdrawal of the rejections is respectfully requested.

Conclusion

For the foregoing reasons, allowance of the application is respectfully requested. If there are any questions concerning this response, the Examiner is respectfully requested to contact the undersigned at the number given below.

Respectfully submitted,

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